World Financial Markets

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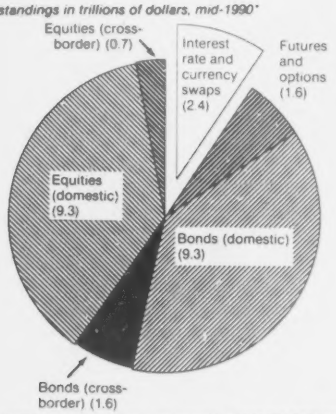
Chart 1

Swaps in the world's financial markets

*outstandings in trillions of dollars, mid-1990**



*End-1989 for bonds, futures, and options. Swaps are measured by notional principal, futures and options (exchange-traded, interest rate and currency only) by open interest, bonds and equities by market value in the markets of eleven industrial countries (United States, Japan, Germany, France, United Kingdom, Italy, Spain, Netherlands, Belgium, Australia, and Canada). "Domestic" signifies assets held by residents of the country of issuer; "cross-border" signifies those held by non-residents and includes bonds issued by all governments in the Euromarkets and by international organizations in all markets.

Swaps: versatility at controlled risk

Of the many extraordinary financial developments of the past ten years, few can rival the burgeoning of the global markets for currency and interest rate swaps. Barely out of the starting gate at the beginning of the 1980s, the aggregate of contracts outstanding in these markets exceeds $2½ trillion today. This takes swaps well into the league of major financial markets (for a comparison — albeit imperfect — see Chart 1).

The essence of a swap contract is the binding of two counterparties to exchange two different payment streams over time, the payments being tied, at least in part, to subsequent — and *uncertain* — market price developments.* In most swaps so far, the prices concerned have been exchange rates or interest rates, but they increasingly reach out to equity indices and physical commodities, notably oil and oil products. All such prices have risk characteristics in common, in quality if not in degree. And for all, the allure of swaps may be expected cost saving, yield enhancement, or hedging or speculative opportunity.

Financial swaps are simple in principle, and uncommonly versatile in practice. They are thereby revolutionary, especially for portfolio management: a swap coupled with an existing asset or liability can radically modify effective risk and return.

Already, financial swaps, together with futures, options, and other financial derivatives that rose to prominence during the last two decades, have attained a certain maturity. Individually and together, they allow yield curve and currency risks, and liquidity and geographic market considerations, all to be managed *separately* — and also independently of underlying cash market stakes.

The separation allows access to new markets, cost savings on debt issuance, the creation of synthetic assets advantageous for investors, and enhanced, more cost-effective tools for asset and liability risk manage-

*Swaps in this article do not include foreign exchange "swaps," which essentially are fixed-price spot sale (or purchase) and forward purchase (or sale) agreements; nor central bank "swap" credit lines; nor again LDC debt-for-equity swaps, which normally lead to cancellation of the original debt, whereas currency and interest rate swaps leave existing obligations intact.

ment. It further encourages an evolution of management thinking and decision making away from the traditional framework set by *product characteristics* — which, for example, distinguish cash holdings of equities, interest rate futures, and oil swaps according to legal form and trading forum — in favor of one delineated by *risk fundamentals*, a list headed by those shaping a portfolio's mean and variance of prospective return.

This article begins by illustrating the multiple uses of financial swaps, then surveys their growth and relationship to other risk management tools. The potential of swaps and other financial derivatives, often in combination, is increasingly recognized, not just by borrowers, but by sophisticated investors too — and perhaps more so among some Japanese and European institutions than their U.S. counterparts. Parallelism of use, however, does not prove a case for extension of public exchange regulation of the "over-the-counter" (OTC) markets for swaps, given the important differences between the two types of market.*

The article goes on to offer some perspective on current credit concerns about the swaps markets, concerns that are tending to concentrate the market-making function among entities of unimpeachable standing. Finally, the article assesses whether swaps deliver the benefits advertised, and draws implications for how global integration and the evolving derivatives markets will change the lives of both policymakers and market participants.

Swaps have been a powerful force propelling global capital market integration. They continue to be so. Increasingly they tie together the currency and money markets at all maturities — not merely at the short end — and erode price discrepancies bred by differences of liquidity and credit standing across markets. All this is a gain for global efficiency, yet at the same time negates policies that relied on the old market segmentation.

Realization of swaps' potential, however, will require resolution by governments and judicial authorities of tax and legal issues, plus revamping of management and accounting practices concerning risk exposure. The latter should include broader use of "mark-to-market" (fair market value or replacement cost) conventions for position valuations, in both internal decision making and external regulatory and market reporting.

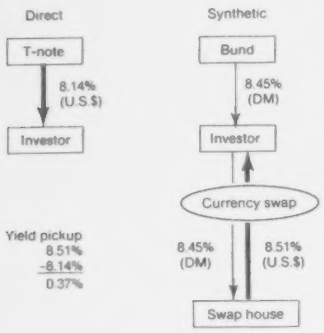
This will take basic overhaul of existing public accounting recommendations. The U.S. Financial Accounting Standards Board (FASB) is aware of the issues at stake, and has made headway on many. But many jurisdictions around the world remain mired in the past in their treatment of derivatives — to the point sometimes of actually forbidding mark-to-market valuations; the shortcomings in turn hamstring

*To be enforceable between U.S. counterparties, *futures* contracts must be publicly exchange-traded and regulated by the Commodities Futures Trading Commission (CFTC). Current CFTC policy correctly places swaps outside the Commission's purview: swaps are not offered to the general public, nor are they readily tradable in the ordinary sense of the word; instead swaps are privately negotiated on highly individualized terms recognizing credit risk considerations (master agreements provide for multiple choices); moreover, mark-to-market settlements between counterparties during the life of a swap are infrequent, if they occur at all. Altogether, swaps are not the functional equivalent of futures, as a U.K. court mistakenly held last year, but instead resemble OTC *forwards*. CFTC policy, however, is not immutable and the Commission's entire mandate currently is up for statutory reauthorization and review.

Chart 2

A synthetic asset for investors

*yield indications as of March 21, 1991, 10-year maturity**



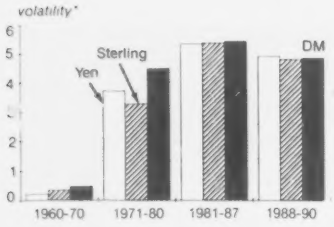
*Measures of the dollar cash flow from a U.S. Treasury note compared with that from a German government bond (Bund) with its mark cash flow swapped into dollars. Against the yield pickup, the investor would sacrifice a degree of liquidity, assume credit risk on the German government and the swap house, and be open to price risk if the maturities of cash flows of the Bund and swap fail to match exactly those of the Treasury note.

Chart 3

The dollar's exchange rate

units per dollar, 1970=100

*volatility**



*Period averages of absolute quarter-to-quarter percent changes in dollar spot rate.

derivatives transactions with entities subject to FASB rules.

These matters will not be cleared up overnight. Along the way, however, the swaps markets can be expected to continue to flourish. New risk management applications of swaps will come on stream, especially in the equities and commodities sectors. For market makers, success will go to those with capital strength, global reach, and integrated organization. And the value of swap techniques will become known and accessible to an ever-broadening class of borrowers and investors.

Some key uses of swaps

Today's financial swaps markets offer what may seem a dizzying array of products, yet all may be classified under three general headings in terms of their value to borrowers and investors: cost saving or yield enhancement on existing activity; the hedging of existing risk; and opportunities for new activity judged advantageous. Thus, globally, the key uses of swaps lie in the arbitrage of yield and credit differentials across borders, the management of interest and exchange rate risk, and the cost-effective global diversification of funding and investing.

The first heading probably provides the most common and compelling motivation for swap activity. Thus, on the borrower side, the celebrated 1981 World Bank-IBM swap allowed the Bank to achieve its desired Swiss franc funding, and IBM its preferred dollar funding, at substantial cost savings to each relative to traditional direct bond issuance. In more recent times, a firm having no natural need for, say, ECU funding may be able to exploit good name recognition internationally to sell an ECU bond issue and swap into dollar funding below cash market cost. Correspondingly, an investor last year who had customarily held U.S. Treasuries could replace them with German Bunds plus a mark-dollar currency swap — both of maturity similar to the Treasuries. During much of 1990, and still to a lesser extent more recently, the replacement would have achieved a substantial covered yield pickup in dollar terms (see Chart 2).

As for hedging, a firm mindful of the high volatility of exchange rates (see Chart 3), and with foreign-currency liabilities not matched by assets, may enter a currency swap to protect against a rise in home-currency debt-service costs due to home-currency depreciation. Equally, an investor holding a long-term bond can protect asset value through a period of expected interest rate turbulence by entering a swap into floating-rate income during that period, rather than selling the holding outright.

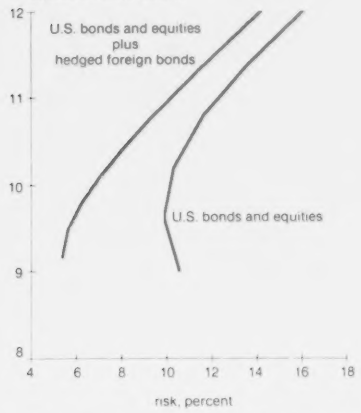
An example of new activity is that of a firm that has traditionally funded itself in its home currency but that faces major interest rate risk thereby; foreign-currency funding may offer a preferable exchange and interest rate risk combination. If little known abroad, the firm may lack direct access to foreign-currency funding, yet be able to achieve the indirect equivalent by swapping out of available home-currency funding. Likewise, a portfolio manager may be desirous of the diversification a foreign bond component would bring but yet be precluded, by instruction or for credit reasons, from investing abroad directly. When instruc-

Chart 4

Investor gains from diversification

*risk-return trade-offs for the dollar-based investor diversifying into non-U.S. bonds**

expected return, percent



*Portfolio performance was simulated with the observed volatility of 1978-90 and assumed returns of 9% and 12% on bonds and equities, respectively. Returns include capital gains or losses; risk is measured by the annualized standard deviation of monthly returns, with hedges eliminating the currency risk of foreign bonds. Bond and equity components match the dollar and nondollar compositions of the J.P. Morgan Government Bond and the Morgan Stanley Capital International indices, respectively, and are given weights in the simulated portfolios to minimize risk for any specified return. Risk reduction stems from the inclusion of components of lesser own-volatility and the imperfect correlation of returns across asset classes.

	1978-90			
		Correlation with		
	Own risk	U.S. bonds	Foreign bonds Hedged	Unhedged
U.S. bonds	10.6	1.00		
Foreign bonds				
Hedged	5.5	0.42	1.00	
Unhedged	13.5	0.40	0.59	1.00
U[illegible]es	16.1	0.31	0.17	0.07
F[illegible]n equities				
	13.3	0.11	0.26	0.14
	17.6	0.21	0.39	0.68

tions permit, this diversification can be accomplished by buying a domestic bond and swapping its income stream into foreign currency, or a domestic bond structured to pay income equivalent to that of the currency swap. Or, if the inhibition applies to currency risk rather than foreign holdings *per se*, swaps can hedge away currency risk on foreign bonds held to improve a portfolio's risk-return trade-off (see Chart 4).

These examples make the point that, both in principle and increasingly in practice, swaps allow any kind of payment stream to be switched into any other of equal perceived current value — albeit with liquidity and credit risks. Borrowers have tended to be more adventurous in exploiting the potential of swaps, but recognition of their value also is growing among sophisticated investors; indeed, some Japanese institutions and a number of Europeans with cross-border interests have been more forward than their U.S. counterparts in this respect. Moreover, recognition can be translated into action more readily and systematically than before, now that swaps market pricing brings transparency and simplicity to the evaluation of the wide range of alternatives facing both borrowers and investors.

The rise of the swaps market

Today's financial swaps markets owe their origin to the exchange rate instability that followed the demise of the Bretton Woods system in the early 1970s and to the controls on international capital movements that most countries maintained in those days. For example, U.S. firms suffered unwelcome volatility of earnings from foreign operations and the accounting valuation of their foreign assets, while some U.K. firms had difficulty in funding overseas subsidiaries. Both problems were addressed with a degree of success by the innovation of "parallel" loan agreements and — their close cousins — "back-to-back" loans.

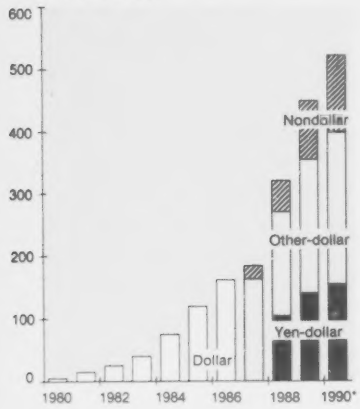
The latter typically involved a U.S. firm extending a dollar loan to a U.K. firm and simultaneously taking an equivalent sterling loan from that same U.K. firm. The principal amounts of the two loans were defined by the spot sterling-dollar exchange rate upon initiation; subsequent interest and amortization payments were on negotiated terms denominated in the currencies of the respective loans. The U.S. firm thus obtained a hedge for its exposure to sterling depreciation and the U.K. firm obtained dollar funding and a hedge against dollar depreciation. These loans had drawbacks, however. They ballooned each party's balance sheet. And, lacking established right of offset, they posed default risks to both parties.

Invention of the *currency swap* tackled both drawbacks. The swap rewrote the separate loan agreements as a single contract for the exchange of principal and interest streams. The swap then was functionally equivalent to a sequence of forward contracts. It thereby qualified for off-balance-sheet regulatory and accounting treatment limiting disclosure and enhancing measured return on capital. Moreover, under the single contract umbrella, one counterparty would be released from continuing obligation upon the nonperformance of the other.

Chart 5

Currency swaps

notional principal outstanding at year-end, billions of dollars



*Midyear estimate from new swap data reported to the Internationals Swap Dealers Association (ISDA); ISDA estimates for 1987-89; fragmentary estimates for earlier years.

Initially, currency swaps were brokered or matched case by case. It was no small task to bring together acceptable counterparties with matching needs and timing, let alone settle contractual fine print. Yet here was a natural challenge for the skills of intermediaries, whether in lining up direct counterparties or, more important, in taking on swaps as principals (perhaps only until finding matching counterparties) and serving as market makers. Not until 1981, however, did the developing market take flight, thanks most of all to the World Bank-IBM swap; the prestige of these names heightened awareness of the new market and built confidence in its legitimacy.

The currency swap market has grown rapidly ever since. From a modest $5 billion in 1981, contracts outstanding reached an estimated $520 billion "notional" principal by mid-1990 (see Chart 5), based on reports to the International Swap Dealers Association (ISDA).* Many swaps historically have been intertwined with new bond issues. Many swaps still are, but the connection loosens the more risk management and diversification of existing portfolios become the main motives.

Befitting its paramount role in international finance, the dollar stood as one leg of 79% of all currency swaps outstanding at end-1989 (see Table 1), just as it provided one leg of some 90% of world spot foreign exchange transactions surveyed earlier that year. Still, swaps between nondollar currencies mushroomed sixfold between 1988 and mid-1990; they constituted over one-third of new swaps in the first half of last year — double the 1988 proportion. Further, though the dollar dominates, European entities — not U.S. firms — are the principal end users of these markets (see Table 2).

Identical currencies on the two sides of a swap define an *interest rate swap*. Its feasibility and value for maturity risk management first came alive in 1981-82 amid exceptional dollar interest rate volatility and a deep U.S. economic recession; this was a difficult environment for all but the strongest names seeking long-term, fixed-rate, dollar funding, so that many borrowers retained effective access only to short-term, floating-rate credit.

Table 1

Currency swaps

notional principal

	New swaps				
	1987	*1988*	*1989*	*1st half 1990*	*Outstanding, end-1989*
*Total, billions of dollars**	86	124	170	189	449
*End user**	69	95	123	136	334
*Market maker**	17	29	47	53	115
Dollar	77	104	132	125	354
Yen	27	46	80	85	201
Swiss franc	13	21	17	31	65
Mark	12	17	18	24	54
Australian dollar	14	13	40	33	62
ECU	9	12	13	17	40
Sterling	4	10	16	16	33
Other	17	26	39	47	90
(Nondollar)	10	20	37	65	95
*Average size, millions of dollars***					
Dollar	26	31	23	24	28
Nondollar	28	32	23	15	29
*Average remaining maturity in years***					
Dollar	5.3	5.3	4.9	4.5	4.8
Nondollar	5.1	5.4	5.2	5.0	4.8

*Adjusted for double counting due to reporting of the currencies on the two sides of each swap.
**Swaps with end users, except 1st half 1990: all swaps at annual rates.
Source: ISDA.

*"Notional" principal is the amount that yields the actual two-way interest payments to be exchanged, given the rate formulas in the swap contract. Exchange of principal is not always involved in a currency swap, and is wholly redundant in a single-currency interest rate swap.

Table 2

End users of financial swaps

notional principal, billions of dollars at annual rates

	New swaps: 1st half 1990		Outstanding, end-1989	
	Currency	Interest rate	Currency	Interest rate
Total	270	670	334	955
*By location**				
United States	30	230	52	373
Canada	22	30	21	35
Europe	116	246	144	323
Asia	74	88	73	120
Australia and New Zealand	20	34	24	66
*Other***	10	42	20	37
By type				
Financial institutions	92	396	142	582
Corporations	108	158	116	297
Governments	50	66	66	76
*Other***	20	50	10	0

*Mainly by end user's principal place of business, otherwise by location of booking entity.
**Includes unallocated.
Source: ISDA.

Today, given that most businesses and financial institutions in the large, less open economies are inherently more exposed to interest rate risk than exchange rate risk, and given too that the interest rate swap is a fundamentally simpler and more standardized tool for both end users and market makers, it should not be surprising that for most currencies the interest rate swap market has grown substantially larger than the currency swap market.*

Indeed, the total notional principal of interest rate swaps outstanding in mid-1990 probably approached $1.9 trillion (see Chart 6 and Table 3), up 90% from the end-1988 total and more than triple the aggregate of currency swaps. The great majority of interest rate swaps are "fixed/floating," whereby payments at a rate fixed for the life of the contract are exchanged for payments at floating rates reset periodically by reference to some agreed market index, most often LIBOR. Otherwise, floating/floating "basis" swaps, for example of a commercial paper rate against LIBOR, formed 12% of new swaps in the U.S. dollar sector in the first half of 1990, but were limited elsewhere. Financial institutions, keenly aware of interest rate risk, remain the most active end users, accounting for just over 60% of all such swaps outstanding at the end of 1989 and the same share of new business during the first half of 1990.

Over three-fifths of all interest rate swaps outstanding in mid-1990 were in dollars. The dollar share in new swaps written during the first half of the year, however, was not much more than half. Although activity in the dollar sector seems to have surged anew toward the end of 1990, much of the year was dominated by escalating concerns about counterparty credit risk and the increasing cost of the bank capital required to back swap exposure. Credit worries now largely exclude many once-prominent users of swaps, notably thrifts and some other financial institutions, real estate ventures, and highly leveraged entities. In addition, the improving liquidity of longer-term Eurodollar futures may be eating into swap demand.

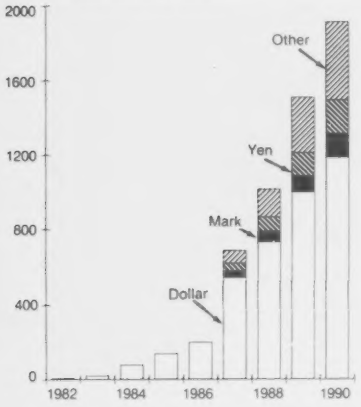
By contrast, though interest rate swaps in nondollar currencies at first lagged development of the dollar market, they have grown explosively in recent years;

*The yen has been the major exception, thanks to the relatively free scope for Japanese corporate bond issuance overseas and the traditional regulatory exclusion of Japan's city banks from long-term yen funding. Also, currency swaps in general, especially of short maturity, have had to compete with a broad and long-standing forward foreign exchange market, whereas interest rate forwards date only from 1983.

Chart 6

Interest rate swaps

notional principal outstanding at year-end, billions of dollars



*Midyear estimates from new swap data reported to ISDA. ISDA estimates for 1987-89, fragmentary estimates for earlier years.

in fact, their aggregate notional principal outstanding appears to have grown *fivefold* in just the two-and-one-half years ended mid-1990. The yen and sterling markets headed the pack, followed by those for the mark and Australian dollar, and the first half of 1990 saw a veritable burgeoning of activity in most European currencies and the ECU. Moreover, swaps between ISDA members have come to run as much as two-fifths of all newly written interest rate swaps in the nondollar sector (see Chart 7). The corresponding ratio has been much the same in the dollar sector, and in both cases far above these market maker ratios for currency swaps — a confirmation of the more developed and liquid nature of the interest rate swaps markets.

The great bulk of swap activity to date has concentrated on currencies and interest rates, yet these do not exhaust the swap concept's applicability. One extension is seen in the beginnings of a market for *equity swaps* — an exchange of coupons on some bonds for dividends on some equities, or an index instrument thereof (capital appreciation also may be included on one or both sides of the swap). The purpose is to earn equity returns when the investor deems them promising but without the transactions costs of liquidating an existing bond position or building an outright equities position, while also avoiding the complications of unfamiliar local markets and the time and trouble of stock-picking if the index will suffice. Equity swaps (and, indeed, all swaps) further may be enhanced by options features customized to the interests of the creditworthy, sophisticated investor.

Commodities are another fertile area for swaps in view of the limited scope of price protection alternatives. There is modest, but growing, swap activity in the principal non-ferrous metals, such as copper and aluminum, and rather more in gold, based partly on the advantages of the swap instrument for protecting long-term project financings vulnerable to price instability. The major focus, however, now lies on petroleum and petroleum products. This is the physical commodity sector most critical to final economic uses. Moreover, since the mid-1980s, this sector has become one of the most heavily traded in the cash and futures markets worldwide. The very high short-term volatili-

Table 3

Interest rate swaps

notional principal

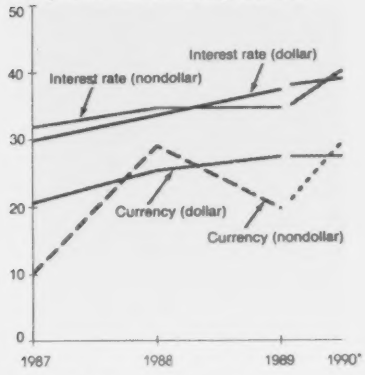
	New swaps				
	1987	*1988*	*1989*	*1st half 1990*	*Outstanding, end-1989*
Total, billions of dollars	388	568	834	1123	1503
End user	262	375	516	677	956
Market maker	126	193	318	446	547
Dollar	287	366	545	589	994
Yen	32	43	62	135	128
Sterling	21	46	68	119	100
Mark	22	33	41	97	85
French franc	4	16	28	25	42
Swiss franc	5	12	24	43	29
ECU	2	8	12	25	19
Australian dollar	10	20	35	36	68
Canadian dollar	3	11	13	25	29
Other	3	4	6	19	86
Average size, millions of dollars*					
Dollar	24	27	28	31	27
Nondollar	12	15	13	17	12
Average remaining maturity in years*					
Dollar	4.1	3.8	3.7	3.4	3.8
Nondollar	5.1	4.7	4.1	4.1	3.9

*Swaps with end users, except 1st half 1990: all swaps at annual rates.
Source: ISDA.

Chart 7

Swaps market making

swaps between ISDA members (including those for their own end use)
as percent of total outstandings at year-end

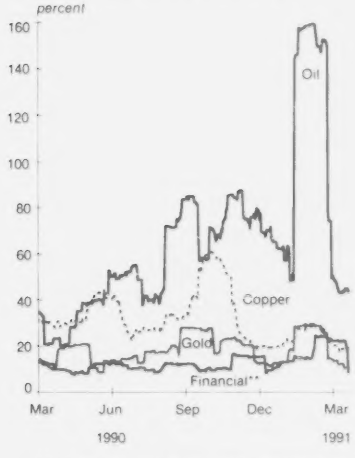


*First-half data, for new swaps only.
Source: ISDA/BIS.

Chart 8

*Historical price volatility**

percent



*Annualized standard deviation of the immediately preceding 30-days' daily percent changes in dollar-denominated price.
**Yield on 10-year U.S. Treasury bond.

ty of oil prices (see Chart 8) — especially after the Middle-East Gulf crisis erupted last summer but also during other periods of strain since OPEC began withdrawal from market price support in the early 1980s — makes a powerful case for the active application of risk management products in the oil sector.

Apart from inventory control and one-off transactions, most underlying petroleum business relates to regular, long-term, oil and product flows between producers and consumers. Swaps have a natural edge in this field, backed by the technology and experience developed in the financial sector. Moreover, swaps can be deployed to manage the considerable basis risks prevalent in the petroleum sector, for example, between crude oil and jet fuel.* In addition, oil (and other commodity) swaps can sometimes be coupled to advantage with commodity-linked financings for entities having no intrinsic commodity involvement, or be tapped by investors seeking to hedge or create commodity exposure.

As noted earlier, credit concerns, plus the burden of capital requirements, hampered the growth of some swaps markets in 1990. Yet heavy activity in many swap sectors and increasing competition as new and well capitalized players still enter the fray have given swaps a liquidity and economy of transactions costs that stand favorable comparison with those in the cash markets.** High-quality bid-offer spreads — between the fixed rates a market maker receives on one swap and pays on a matching transaction — have crumbled since the early days of innovation to the 5-7-basis-point range today for interest rate swaps (in terms of annual yield), and to the 7-10-point range for currency swaps — sometimes even less.

Alternative risk tools

Swaps are not the only means available to manage currency and interest rate risks. The alternatives include not only conventional cash instruments but also financial derivatives (see Charts 9 and 10) such as futures, options, and forwards — these last being close cousins of swaps. Each class has its own characteristics, advantages, and shortcomings, as indeed do swaps.

In principle, portfolio managers can realign rate risks as desired by dealing in the *cash markets*, unless prevented by regulation or tax penalties. In practice, the transactions costs of purely cash market strategies may be daunting, while their liquidity and credit risk implications also may not be acceptable. Indeed, the quality of the cash markets varies widely from one instrument to another and also across countries and currencies. Moving in and out of U.S. Treasuries is easy. But private-placement investors rarely

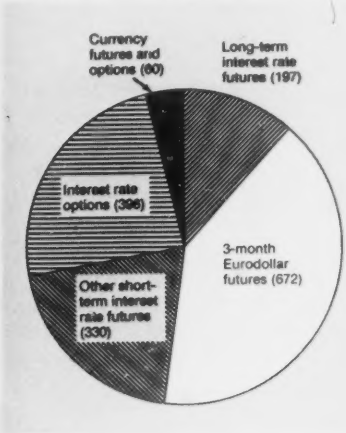
*The sector spans numerous grades of crude and a raft of intermediate and final products, all differentiated also by location. This profusion breeds risks of a multiplicity and complexity beyond the scope of futures contract management.

**Secondary trading is crucial for the liquidity of any market. The trading of an existing swap, in the sense of a complete assignment of rights and obligations from one counterparty to a successor, is complicated by the need for the acquiescence of the second original counterparty; this acquiescence may well be withheld out of concerns for credit exposure. Instead, most secondary swap "trading" writes new swaps having cash flows equal and opposite to those of the swaps "sold"; the new swaps may be written into the market or between the original counterparties; or else the latter may agree to a cash settlement to terminate an existing swap.

Chart 9

Exchange-traded derivatives

open interest at end-1989, billions of dollars


Currency futures and options (60)
Long-term interest rate futures (197)
Interest rate options (396)
3-month Eurodollar futures (672)
Other short-term interest rate futures (330)

Source: BIS.

enjoy comparable liquidity.* For their part, borrowers must contend with major costs and delays when, say, retiring a bond issue in one currency and refinancing with a new issue in another. Additionally, cash market transactions to adjust rate risk also shift credit risk.

Credit risk is largely overcome in the currency and interest rate *futures markets*. A futures contract predetermines a price to be paid at expiration for a prescribed financial instrument, for example, the current benchmark issue of Japanese government bonds. If interest rates rise, the value of the contract to the buyer falls, which ordinarily would represent a credit risk to the seller. Organized futures exchanges minimize this risk by requiring posting of collateral in the form of a margin, and by using this margin to make daily cash settlement with a clearing house of the mark-to-market value of the contract followed by margin calls if necessary. Collateral and frequent cash settlement do entail costs, including unpredictable cash flows. Still, exchange participants need not concern themselves with the credit standing of one another individually, but only with that of the exchange as a whole.**

Financial futures markets emerged in the early 1970s in the United States, but took off slowly elsewhere — in London and Sydney by 1982 but much later in Tokyo, Paris, and Frankfurt. Open interest positions on organized financial futures exchanges totaled $1.2 trillion worldwide at the beginning of 1990 (see Table 4). Interest rate futures were nearly 99% of the total. Four-fifths by value were for short-term instruments and, though other currencies are fast gaining ground, over half specifically for 3-month Eurodollars; the latter, traded daily to the tune of over $180 billion notional in 1989, are heavily used by banks as an alternative to rate risk management through the interbank market where credit is an inseparable factor. The markets for futures on long-term interest rates are unusual in that Japanese governments (JGBs) are the most active sector, not U.S. Treasuries, and a major market has developed offshore in London for German governments (Bunds), whereas a Frankfurt market is only just getting started.

The JGB and Bund futures

Table 4

Exchange-traded futures and options

traded on principal exchanges

	Contract turnover, millions			*Open interest, $ billions end-1989*
	1987	*1988*	*1989*	
Futures				
Total	167	178	229	1215
On interest rates	146	156	201	1199
Short-term	29	34	70	1003
3-month Eurodollars	24	25	47	672
Long-term	116	123	131	196
U.S. Treasury bonds	68	72	71	32
10-year Japan government bond	18	19	19	129
On currencies	21	22	28	16
Options				
Total	48	50	62	433
*On interest rates**	29	31	42	388
*On currencies**	18	18	21	44

*Including options on futures.
Source: BIS, exchanges, and Futures Industry Association.

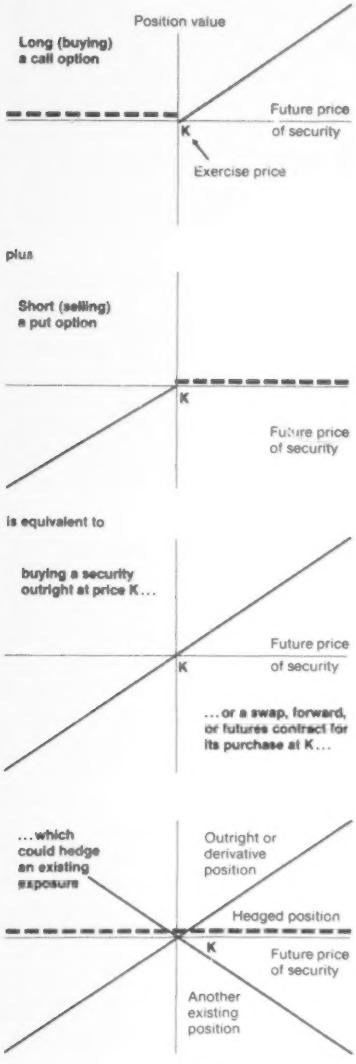
*Their situation may improve eventually through such initiatives as the beginnings of screen-based trading following the new U.S. S.E.C. Rule 144A of last spring, which liberalized resale of unregistered securities.

**Not a purely academic concern, recalling the collapse of the International Tin Council in 1986 and the fallout for the London Metal Exchange. To cope with large defaults, some exchanges explicitly insure contracts, raise assessments on members, or make special calls on them.

Chart 10

Risk equivalence of derivatives and outright holdings

*derivatives and outright cash holdings may be combined to replicate one another in terms of position value, that is, exposure to changes in the price of an underlying security, or to hedge another existing exposure**



*Diagrams abstract from transactions costs and time value, and assume that "in-the-money" options are always exercised by the holder. The holder of a call option has the right to purchase the underlying security at the exercise price during a specified period; the holder of a put has a similar right to sell. Only the writer of an option contract—not the holder—has an obligation to perform, and only if the contract is exercised; in the other contracts, both parties perform.

contracts have been highly successful. So too, if more recently, have the futures on French governments (OATs). And the success feeds on itself, especially once these contracts begin to offer more liquid markets than do the underlying cash instruments. Indeed, in Japan, transactions by financial institutions in JGB futures reportedly have come to run more than double their activity in the corresponding cash markets.

Despite the impressive growth of the financial futures markets overall, not many of the 200 or more individual contracts worldwide have truly flourished. Perhaps ten to twenty offer good to excellent liquidity, whereas the remainder leave much to be desired on this score. Sometimes accounting rules are to blame. Other times, the delivery options upon contract expiration have proven much inferior to the cash settlement allowed on, say, Eurodollar contracts.* And in many other cases, contracts have faltered for lack of natural demand or significant advantage over established, active contracts. For example, the rate risks addressed by 1-month Eurodollar or municipal bond futures are in large part met by highly liquid 3-month Eurodollar and U.S. Treasury futures, respectively.

Moreover, one general shortcoming of futures markets must be recognized. For the sake of liquidity, the range of active contracts necessarily is limited both by type of underlying instrument and in choice of expiration dates. In fact, though some futures markets offer maturities of two years or longer — for example, in Eurodollars — for the most part liquidity tends to fall away sharply beyond one year. To manage longer-term risks, one solution often recommended is a "rolling hedge" whereby short-term contracts are repeatedly rolled over into new ones as each nears expiration; this solution is quite imperfect, however, due to transactions costs and the major uncertainly attaching to the future pricing of contracts not yet extant.

Currency and interest rate *options* provide another tool for rate risk management. Indeed, arbitrage closely links such options to the cash and futures markets, particularly at the short end. On the organized exchanges, worldwide open interest in currency and interest rate options, including options on futures, was a little over $400 billion at the end of 1989, 90% in interest rate options. The total, however, was just one-third that for financial futures. Exchange-traded options share the near-absence of credit risk shown by futures, but also are subject to much the same liquidity and maturity limitations.

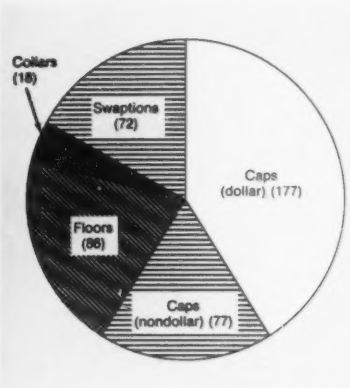
Instead, option activity concentrates in the OTC markets, despite the option holder's consequent credit exposure to the writer. About 80% of currency options are sold OTC according to an April 1989 central bank survey (even so, options accounted for a mere 2% of gross foreign exchange market turnover at that time, 40% being in forwards, futures, and swaps, and the balance in the spot markets). OTC interest rate options — in the form of "caps," "floors," "collars," and the like — totaled $380 billion in notional outstandings at the end of 1989 (see Chart 11) and may have surpassed

*The delivery factor doomed both the once-prominent U.S. Ginnie Mae contract and the U.S. bank CD contract, the latter from credit quality concerns in the wake of the 1984 failure of Continental Illinois.

Chart 11

Caps, floors, collars, and swaptions*

notional principal of outstandings, billions of dollars, end-1989

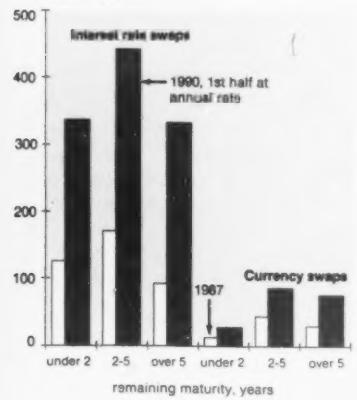


*More than two-thirds of the end-1989 total were options on dollar interest rates. The collars data include participations options on caps and floors.
Source: ISDA.

Chart 12

Swap maturities

notional principal of new contracts, billions of dollars



Source: ISDA/BIS.

$500 billion one year later. Sold for an up-front premium, caps pay the buyer in the event that interest rates rise above some ceiling during the contract period; floors pay correspondingly on the downside; and collars contain the buyer's rate risk within specified ceiling and floor levels. In 1989 many borrowers sought to contain upside risk on the floating-rate financing of highly leveraged transactions; during 1990, the end of the leverage fad damped dollar cap demand, but investors found new charms in floors on the prospect of lower dollar interest rates and in interest rate options generally in other currencies.

Analytically, and in their actual pricing, these OTC interest rate options are the direct offspring of the swaps market. Indeed, they illustrate its creative energy. Another example is found in "swaptions" — options to enter a swap on preset terms during some future period. Purchase of a swaption may be an attractive insurance for a business facing an uncertain future funding need. And swaptions have been used extensively to arbitrage the apparent investor mispricing of call options embedded in many bond issues — an arbitrage that inevitably fades once the mispricing is widely recognized. By the end of 1989, a notional principal of over $70 billion was outstanding in swaptions, with some $33 billion in new business put on during the first half of 1990.

Whereas option holders bear one-sided credit exposure to the writers, participants in the OTC markets for *swaps* bear mutual exposure.* Yet swaps have important advantages over exchange-traded derivatives. Whereas the latter come in standardized lots, swaps can be tailored in multitudinous variety to the precise needs of the end user, often as key constituents of elaborate "structured" financings. In addition, as OTC instruments, swaps preserve confidentiality.

For managing risk over longer maturities, swaps are the clear instruments of choice. From 1987 through the first half of 1990 new interest rate swaps nearly tripled in volume at an annual rate in the over-two-year maturity classes (see Chart 12) while the corresponding volume of new currency swaps more than doubled. By contrast, exchange-traded derivatives generally are not very active beyond one year's term. Nor are OTC *forwards*. Shorter-term forward markets in foreign exchange are long-standing and highly developed — to the disadvantage of currency futures. But long-dated forwards have been quite another matter. Such liquidity as they display largely comes courtesy of the swaps market, since that is where forward market makers can best lay off their risks.

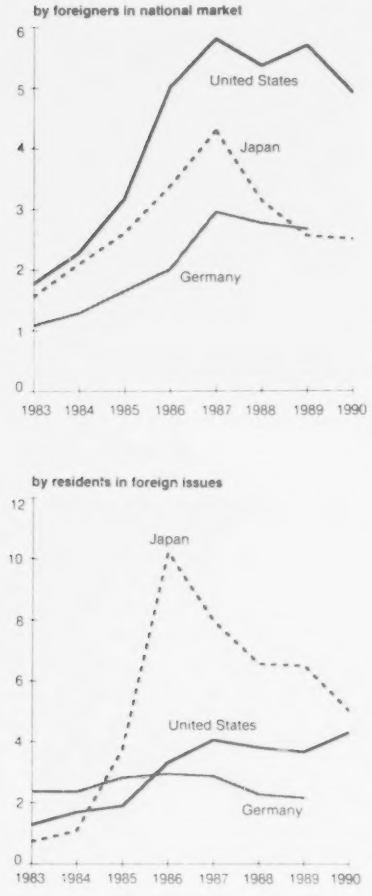
Looking to the future, there may well be some blurring across derivative product lines, if less than meets the eye. For example, the Chicago Board of Trade hopes to introduce a futures contract on swaps this spring. It will provide a means for swaps end users and market makers to hedge interest rate risk. It remains to be seen, however, whether the contract will be seen as sufficiently distinctive to withstand the competition from established Eurodollar futures. Besides, a holder of the proposed

*This is true equally of forward markets. The cash flows of a swap are identical to those of a sequence of forwards, except that the performance period is the interval between consecutive payments, not the swap's final maturity.

Chart 13

Cross-border securities turnover

*ratios of gross purchases and sales of bonds and equities to holdings of same**



*Purchases and sales from national balance of payments data; holdings from external investment position data.

swaps futures contract will not become counterparty to an actual swap; rather, on expiration, the holder will have made or received a cash settlement based on prices to be gathered from selected swaps market makers — leaving actual swaps to the existing over-the-counter markets. Nevertheless, whatever the fate of this particular proposed contract, continuing gains in liquidity will render the more commodity-like OTC products increasingly interchangeable with exchange-traded analogues for some purposes. They will retain underlying distinctions, however. The competitive survival of both types will hinge on these distinctions and their value to the end user.

For derivatives as a whole, some of the prospective growth in activity is likely to be at the (relative) expense of the cash markets. It is worth noting here that in each of the main national markets — the United States, Japan, and Germany — ratios of reported cross-border cash turnover in foreign securities to total hoidings of such securities increased markedly during the middle years of the 1980s, but largely ceased to do so after 1987 and in some cases declined (see Chart 13).

Conceivably, this signifies less active management of international portfolios after 1987. Yet that seems inconsistent with the liberalization of markets worldwide. More likely, activity has shifted away from the cash markets because derivatives are proving the more cost-effective means to manage risk. It is a fair conjecture that this trend will persist as the class of derivatives users widens, expands, and grows more familiar with these products, and as risk management and diversification motives become their driving force.

Swap pricing and credit risk

Early swap transactions were anything but standardized and typically were arranged between two end-user counterparties with no risk-taking intermediary. Pricing was subject to protracted negotiation. And the ultimate terms, which usually included fees for the arranger, were more a matter of mutual acceptance than of precise alignment with those for financing alternatives, if available. Still, it was inevitable with time that moves toward standardization and increasing competition would render the pricing of swaps keenly sensitive to that of alternatives.

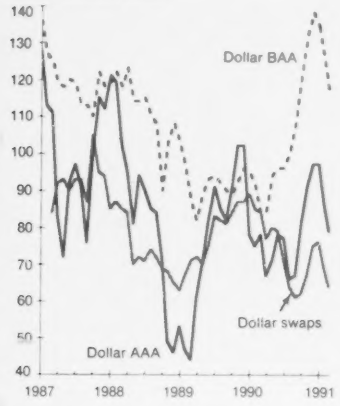
Crucial here was the advent of market makers as principals in most swaps. The terms of their dealings with end users are often customized and unpublicized but are nonetheless subject to intense competition. Among the market makers themselves, this same competition — and the resulting liquidity of the market — allows open quotation of realistic bid and offer swap rates subject always to credit considerations. Swap quotes are given either outright or, especially in the dollar markets for "plain vanilla" fixed/floating interest rate transactions, as basis-point *spreads over Treasuries* of the corresponding maturity on the fixed-rate side against 6-month LIBOR on the floating side.

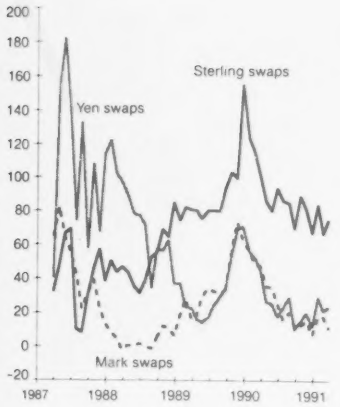
As in many mature financial markets the *bid-offer spread* provides the market makers' sole compensation, arrangement fees now being a thing of the past. Under the impetus of fierce competition the typical spread has

Chart 14

Swap and corporate bond spreads

*basis-point yield spreads over 10-year government bonds**





*Swaps: fixed interest rates payable versus 6-month LIBOR on new 10-year maturities; corporate bonds: average secondary markets yields on U.S. domestic issues of original maturity greater than 20 years, but of variable remaining maturity (contrast Chart 16)

narrowed sharply over the years. Some goes to cover transactions costs — now greatly diminished by progress in standardization of swap contract language, technological advance, and economies of scale. The remainder remunerates the capital needed to support price and credit risks on swap books.

Is that remuneration adequate? The answer appears broadly affirmative, bearing in mind the continued entry of new participants, the retreat by some of those formerly active, the management and systems sophistication of the presently leading houses, and the heightened priority for rate of return across the industry generally.

To limit their *price risks* market makers normally run swap books that are broadly matched, for example by duration and currency. In the short run, however, they assume open positions that must be hedged, at least in part, and otherwise managed within prudent bounds until matching positions can be established through new swaps or the runoff of existing ones.

In some cases, mainly in short maturities, market makers can best hedge their open swap positions by off-balance-sheet forwards, futures, or options transactions. In others, albeit with balance sheet and capital requirement consequences, the cash markets can be tapped. For example, a market maker can hedge the fixed-rate payment side of a fixed/floating interest rate swap by purchasing Treasury bonds of the same maturity, financed by a repurchase agreement. In turn, arbitrage ensures that swap rates generally move in sympathy with trends in the derivatives and cash bond markets.

Still, derivatives or cash market hedges cover only the risk that Treasury yields will rise or fall, not that the swap spread over Treasuries will change in the interval before a matching swap is arranged. In the dollar sector, for maturities up to two or three years, this spread is closely related to that of LIBOR over Treasury rates — normally fairly stable but, as in January this year, a spread sometimes vulnerable to credit- and war- or political-risk perceptions.

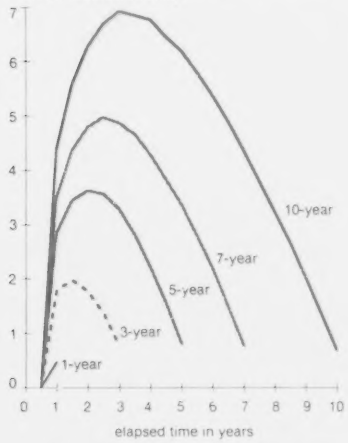
Swap price risk is greater at longer maturities. Here there has been some loose relationship between dollar swap spreads and those available to high-rated, investment-grade borrowers in the fixed rate bond markets (see Chart 14) — to be expected from the long-standing use of swaps by such borrowers. In the past, dollar swap yields, like those on U.S. corporate issues, have tended to lag moves in Treasury yields, partly because credit risk perceptions generally lag the level of interest rates during the economic cycle. Swap spreads over Treasury rates, however, are distinctly less volatile than direct bond issuance spreads, and appear to be losing this corporate connection as swaps become primarily an instrument for risk management.

In the nondollar sector, swap spreads have even less obvious explanation. For example, the low spreads in what is an active yen sector can hardly be determined by conditions in an inactive domestic corporate bond market within an economy where perceived default risk has often been minimal or little differentiated hitherto, at least for major entities. Low yen-sector spreads instead may be traceable to withholding taxes and other im-

Chart 15

*Potential credit exposure of interest rate swaps**

percent expected on notional principal if rates show historical volatility



*Average exposure in 5000 simulations of portfolios of matched pairs of swaps with various original maturities all written at a floating rate (reset semi-annually) versus a 9% fixed rate; the resets were generated as random walks with the volatility observed in 1979-1987. The chart is reproduced from Katerina Simons, "Measuring credit risk in interest rate swaps," *New England Economic Review*, November/December 1989. This study at the Federal Reserve Bank of Boston also found better than a 99% chance that the lifetime exposure of 10-year matched swaps would average no greater than 13% of notional principal; their exposure statistically would be expected to average just 4.8%, broadly in agreement with earlier studies by the Bank of England and Federal Reserve Board and with results from options pricing models.

pediments to JGB cash market liquidity, or to the appetite of Japanese capital exporters for yen bonds that borrowers swap into dollars. Still, it is unwise to be dogmatic as to the underlying causes.

Credit risks have always been acknowledged by swaps participants, as in other OTC markets. At first blush, bid-offer spreads of ten basis points or less on swaps, versus quality spreads (between higher- and lower-rated borrowers) ten times or greater on conventional credits, seem to prove underpricing of swaps. The contrast is misleading: a creditor faces default risk on interest payments and the unamortized principal of a loan throughout its life; but a swap participant's stake is limited to the replacement costs of a swap's remaining cash flows at the market rates prevailing at the time of counterparty default.

For an interest rate swap, those cash flows would not include principal. Instead, they would depend solely on the *differences* between subsequent interest payments on the two sides of the swap. The replacement cost would be the present value of those differences, in other words the net mark-to-market value of the two payment streams. This would begin at zero for a standard on-market "par" swap — an exchange of payments streams at equal expected fair value. Thereafter it could be positive or negative, depending on the evolution of interest rates, before returning toward zero as the swap approaches expiration.* Whenever replacement cost is negative, the swap participant incurs no loss if the counterparty defaults. Moreover, apart from bid-offer spreads, the replacement costs of two matching swaps must be *equal and opposite*.

Thus the credit exposure of a portfolio of swaps, especially if matched, is much less than that of a loan portfolio of like notional principal value. Even so, credit risks were a major factor underlying the expectations once fashionable that OTC swaps would soon be displaced by functionally comparable exchange-traded instruments backed by collateral or margin requirements and frequent cash settlement. In the past, actual or contingent posting of collateral has sometimes featured in swap contracts, by one or both counterparties. Collateral arrangements, however, entail significant administrative costs. Accordingly, they became common in the dollar sector only when U.S. thrift institutions were involved. Today, though rarely warmly entertained, they are seen along with other forms of credit enhancement in commodity and other swaps involving credits below the highest standards.

For the most part, and notwithstanding the planned launch of an exchange-traded swaps futures contract this spring, swaps have continued as OTC instruments free of collateral. Some now call for occasional mark-to-market settlement to limit counterparty credit exposure.** And swaps market making has tended to concentrate

*The return of replacement cost toward zero need not occur in the case of a currency or other swap prescribing a final exchange of principal.

**For example, at each payment date during the life of a standard fixed/floating interest swap, the mark-to-market value of the swap may be assessed and paid to the counterparty for whom this value has turned positive. Subsequently, the fixed rate payable is adjusted to the current market rate, or the notional principal, which determines payments on the floating-rate side of the swap, is adjusted, in either case to restore the swap's market value to zero.

Table 5

Swaps and the international bank capital rules

by December 31, 1992 banks are to hold qualifying capital of at least 8% of total "risk-adjusted assets," the latter including a 50% weighting of "credit-equivalent" exposure on swaps*

Credit-equivalent exposure (each swap)** = Current exposure + Potential exposure

Current exposure of a swap = its mark-to-market replacement value if positive, otherwise zero

Potential exposure of a swap, percent of notional principal***

	Remaining maturity	
	Under one year	Over one year
Interest rate swaps	0.0	0.5
Currency swaps	1.0	5.0

*For Japanese banks, the deadline is end-March 1993. Consistent with other provisions of the BIS rules, the risk weighting on swaps is cut to 20% if the counterparty is a U.S.- or OECD-country-based bank and may be further reduced if cash or qualifying government securities serve as collateral.

**An alternative definition based solely on original notional principal has been authorized, at least on an interim basis, for banking jurisdictions unable or unwilling to implement mark-to-market exposure valuation.

***The assigned percentages may seem low relative to the exposures likely to develop cumulatively during the lives of longer-maturity swaps, but should be interpreted in conjunction with the periodic marking-to-market of current exposures required by the international rules. Simulations, such as those summarized in Chart 15, have been made of the exposure behavior of steady-state portfolios of matched pairs of swaps that span a balance range of new and remaining maturities. Such studies find the probability to be quite low that average exposures will increase more than 0.5% between annual mark-to-market dates, and much lower again if monitoring is semiannual or quarterly.

among principals possessing not only the requisite technology but also ample capital and credit appraisal experience.

Both of the latter have traditionally been more typical of commercial and universal banks than securities houses. Accordingly, commercial banks have become the dominant swaps players. For some, in fact, swaps represent a latter-day reincarnation of traditional intermediation — except now with borrower and depositor often one and the same — much conventional corporate lending having been displaced by securitized financings. Commercial banks, however, hold no monopoly. Many face new capital and credit constraints. Meanwhile, some insurers and high-rated corporates are going beyond their narrow financial needs by deploying capital and credit experience to run swap books for trading profit.

For commercial banks, whatever the rate-of-return objectives and cost allocation practices of their internal management, the credit risk on swaps is highlighted by the capital requirements now being phased in under the auspices of the BIS and similar EC directives. The BIS rules apply to banks with significant international involvement. The Federal Reserve, however, is extending them to all U.S. banks.

The BIS rules conceive the credit risk of a bank's swap book to depend on the sum of two components: "current" plus "potential" exposure.

The current exposure of a swap portfolio is the sum of the mark-to-market replacement costs of each and every swap having positive present value of net cash flows to the bank, with no offset for swaps of negative value except in limited circumstances where these qualify for netting. Given the relevant market indications, the summation gives the aggregate amount at risk in the event of *immediate* default by every counterparty to swaps having positive value to the holder.

More problematic is the measure of potential exposure. The objective is to allow for additional exposure should a counterparty default at some *future* time when interest and exchange rates may be quite different from current rates — and the swap's replacement cost correspondingly different. How different depends mainly on a swap's original maturity, the time remaining to its final maturity, and the future volatility of the interest and exchange rates involved (see Chart 15).

Assessing this volatility and its implications is a complex matter. Yet for regulatory purposes, the premium goes to simplicity. Table 5 points up how the BIS rules adopted in 1988, though less harsh than initially proposed, make minimal distinction by maturity, and none by portfolio composition let alone differences in currency characteristics. Not surprisingly, the swaps industry has viewed these potential exposure add-ons as unduly conservative, and consequently too burdensome on profitability in relation to capital required.*

*Thus it has been argued that interest rates, at least at longer maturities, are less volatile than official studies have assumed; that the potential exposures of swaps significantly in- or out-of-the-money are exaggerated; and that risks on matched pairs of swaps misrepresent those of complex actual portfolios. Moreover, the add-on of as much as 5% for currency swaps, for the actual principal at risk, does not distinguish the much greater volatilities of dollar exchange rates from those of many nondollar cross rates, in particular between EMS currencies.

Another industry grievance has been the reluctance of regulators, avowedly for legal reasons, to recognize the major reduction in swap exposures typically achievable by netting of mutual obligations under multiple contracts between two counterparties, especially when subject to a master agreement.* Major progress has been made in U.S. law, which was amended in 1989 and 1990 to provide certainty of netting of swap exposures in the event of bankruptcy or insolvency by a U.S. corporate or depository institution counterparty. Even so, the sole exposure netting recognized for capital adequacy purposes is by "novation," under which gross amounts due on any value date are legally amalgamated as a net payment. "Close-out" netting, which upon a counterparty's bankruptcy would accelerate and combine future net payments — and so further slash exposure — still is not recognized, and may not be so for some time to come.

Still, industry representations helped bring about the reduced 50% capital-adequacy risk weighting finally accepted for a bank's total current and potential exposure on swaps. Initially, a 100% weighting had been proposed in common with that for all assets not deemed as meriting lower risk designation. In the official view, there were several reasons at first to withhold favorable treatment for swaps: these instruments were subject to legal and fiscal uncertainties; their relative novelty and complexity could strain risk management capabilities; and an overindulgence in off-balance-sheet "financial engineering" might encourage excessive risk-taking elsewhere in the financial system, to the detriment of its overall soundness.

These worries continue to this day. Even so, by 1988 regulators agreed that the high credit quality of most active swap parties and the extremely low historical incidence of swap defaults — a March 1988 ISDA survey, which predated the U.K. local authority debacle, reported a slim $33 million in losses on more than $1 trillion notional swap principal — justified scaling down the risk weighting on swap transactions to 50%. Not all observers were satisfied; some argue that mandatory capital requirements are either superfluous in the face of the demands of the marketplace, or else mischievous — in the longer term driving better-quality business into hands less capital- or credit-constrained and leaving regulated institutions, whose safety was the intended objective, saddled with the riskier, lesser-grade market.

In 1990, criticism of the official calculation of swap exposure and risk weighting gave way to concern about the probability of default by swap counterparties in the United States, Japan, and elsewhere — and not least by banks. Prospective swap losses are as much a function of the likelihood of defaults as of the amounts at risk. So defaults in the credit markets at large during the last year or so, especially in North America, the United Kingdom, and Australia, have rubbed off on swap market perceptions. The concern may have ebbed in recent months. Still, quite a number of players have trimmed their lists of acceptable counterparties, sometimes dras-

*Actual payments of periodic cash flows have long been netted for interest rate swaps, if not for most others, both for convenience and to curb credit risk in practice, if not for regulatory purposes.

tically, or have cut applicable credit limits. The cutbacks extend to some swaps market makers too, given that the travails of the financial sector have impaired the standing of many securities houses and banks, while central banks feel obliged to maintain "constructive ambiguity" concerning their lender-of-last-resort responsibilities lest moral hazard be encouraged.

The potential consequences of heightened credit concerns for the swaps markets are several: liquidity may suffer, as briefly was the case last October; bid-offer spreads may widen, as fleetingly occurred upon the outbreak of Gulf hostilities in January; swaps activity may be squeezed, despite continuing underlying growth in demand, as former or prospective participants find themselves restricted or excluded; collateral or other means of credit enhancement may become more common; and swaps market making may further concentrate on the better capitalized institutions, including new entrants from outside the securities and banking sectors.

Are swaps a free lunch?

Whatever their virtues for portfolio diversification and risk management — and these are primary motivations today — the original lure of the swaps markets was the promise of unambiguous cost savings for borrowers and higher yields for investors. The perception has been that, by exploiting price discrepancies within national markets or across international borders, swap deals deliver gains, even "a free lunch," for all concerned.

Free lunch claims always should be entertained with caution. Yet they sometimes turn out correct where financial markets are segmented or otherwise imperfect. When swaps first were being honed in the late 1970s and early 1980s, segmentation was very much the order of the day. Within national markets, regulatory and tax practices walled off subsectors and often dictated pricing and credit access. Between national markets, most countries enforced capital and foreign exchange controls, which helped preserve regulatory and tax inconsistencies that would have been unviable given market freedom. Often the inconsistencies were egregious, and the rewards of astute application of the swaps concept correspondingly huge.*

Governments and regulators eventually noticed the power of derivatives to exploit cross-market distortions created by national laws and regulations. They might have attempted to cripple the emerging instru-

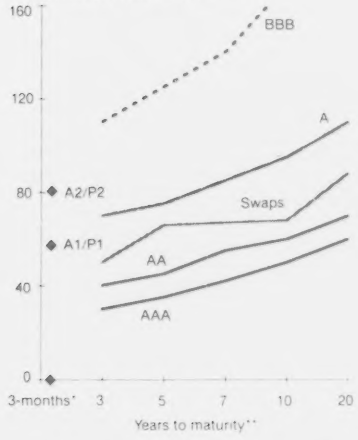
*An instance of segmentation circumvented was the 1978 financing of the Venezuelan metro project. At the time, industrial-country governments offered export credit at uniform interest rates, regardless of market inflation and exchange rate expectations. The French economy was widely viewed as prone to both inflation and franc depreciation. The Venezuelans could have accepted the French franc export credit at a negative real interest rate (courtesy of the French taxpayer), but with an uncovered exchange risk. To achieve the first, and avoid the second, a path-breaking financing package was devised which was equivalent to swapping the French franc credit into dollars at a negative effective nominal rate. The end-user borrower gained handsomely thereby without incurring franc exposure.

A case of tax and regulatory arbitrage through swaps occurred in 1984, when Japan still treated interest "income" on zero-coupon bonds as nontaxable capital gain, whereas accruing interest "payments" on zeros were tax deductible for U.S. borrowers. Financing packages utilizing swaps were devised in the market to exploit the discrepancy, enabling a number of U.S. borrowers to procure cheap dollar funding, effectively at the expense of the Japanese taxpayer.

Chart 16

Spreads on swaps and U.S. corporate borrowings

April 5, 1991 indications by credit rating for new dollar-denominated public offerings, in basis points over U.S. Treasuries of like maturity



*Commercial paper, domestic market. One year earlier, the spread between A1/P1 and A2/P2 paper was less than 10 basis points.
**Fixed rate bonds, domestic market.

ments. Instead, many were impressed by new technology and communications that made new restrictions problematic, and were mindful too of the checkered record of past interventions. Some also feared loss of financial business to less restrictive rivals. Accordingly, authorities across the industrial world freed up money, capital, and exchange markets during the 1980s — an effort perhaps crowned by the ongoing 1992 single market program of the European Community — and have corrected some flagrant fiscal anomalies. By now, the process is far advanced, at least on matters of regulation. In addition, most financial transactions costs have tumbled.

The question then arises, at least theoretically, whether swap gains can survive the end of all arbitrage opportunities due to market barriers, imperfections, and inconsistencies, as well as the indefinite shrinkage of transactions costs. The answer often has been argued on credit quality grounds, yet may be better founded in the economics of business decision incentives and judgments.

Consider a "plain vanilla" fixed-floating dollar interest rate swap between two borrowers whose credit qualities differ. There are no significant barriers between the highly liquid short- and long-term credit markets within the United States, yet the quality spread favoring the higher-rated party typically is narrower for short-term floating-rate funds than for medium-, let alone long-term fixed-rate financing (see Chart 16); the two borrowers enjoy differential "comparative advantages" in the two types of funding.* A swap divides the short-term/long-term spread differential such that the higher-rated party borrows fixed and achieves floating-rate funding at below direct cost, and so too does the lower-rated party who borrows floating and swaps into fixed.

Some view the resultant "savings" from swaps as compensating increased risk in some form. For example, the fixed-rate payer assumes a funding or liquidity risk avoided by direct bond finance, namely that the firm's access to the underlying short-term finance could be impaired during the life of the swap; difficulties in rolling over the entire principal of the short-term funds could be far more severe than those of making interest payments on a conventional bond. Thus, the swap imposes additional risk on the firm's stockholders. (If the floating side of the swap is funded by a *committed* medium-term variable rate facility, the rollover worry diminishes; so too, however, does the achievable cost saving in practice.)**

Yet swaps (or other hedging strategies) can generate real

*That the quality spread widens as maturities lengthen is sometimes attributed to the "underpricing" of conventional bank loans. If such underpricing exists, it may be the product of overcapacity in the banking industry and may be sustained by deposit insurance schemes, whether or not these are effectively subsidized. Still, low spreads on short maturities do not in themselves prove underpricing, given that default risks may well compound over time faster for poorer credits than for prime ones.

**The savings alternatively may be illusory or dependent on market mispricing. For example, in the domestic dollar market, the pricing of conventional fixed-rate bonds recognizes any embedded prepayments option. By contrast, unless written with an exit option, a plain vanilla swap is not callable by either party, except for market value. The fixed-rate payer in a swap pays a lower rate than for direct bond finance to compensate for the lack of the prepayment option — an option which in the past has often been underpriced in the bond market, judging from the success of swaptions (noted earlier).

savings in perfectly free markets, for example on so-called agency costs. If funded by long-term, fixed-rate debt, a firm's investments may be skewed toward high-risk activities, on which profits accrue to stockholders but some or all losses are absorbed by bondholders; or the firm may fail to invest in low-risk activities, lest profits safeguard bondholders without benefit to stockholders. To protect their interests, bondholders demand restrictive covenants or exact a risk premium for their long-term funds. The firm can instead borrow short-term — so lenders can swiftly penalize the firm's specific risk if necessary — and, at the same time, swap into long-term fixed-rate funding to avoid general interest rate risk.

More generally, swaps can help a firm take advantage of its own information and judgments, when either differ from those of the marketplace. Thus, contrary to the market, the firm may expect its credit standing to improve down the road; this would counsel against taking on long-term debt at a high risk premium immediately. Short-term funding plus an interest rate swap would protect against rising interest rates generally but let the firm exploit a lower risk premium later. Likewise, a portfolio may contain a bond that the investor thinks due for positive rerating; pending a realizable capital gain from that event, the investor may wish to hedge against an adverse interest rate trend by swapping the bond's coupons into floating rate income.

Assumptions of perfectly competitive, integrated capital markets with negligible transactions costs obviously are not a realistic description of the world as it is. First, differences in name recognition and reputation will continue to provide borrowers comparative advantages in different markets, whether within nations or across borders. Second, barriers between markets may be coming down, but it is unlikely that regulatory inconsistencies will be entirely swept away. Third, it is still more unlikely that fiscal discrepancies will be eliminated, especially as tax codes contend with ongoing financial innovation. On all three counts, if perhaps less richly than before, opportunities will persist, and new ones spring up. The alert asset/liability manager will want to exploit them, to which end swaps are among the keenest arrows in the quiver.

Global integration and changing lifestyles

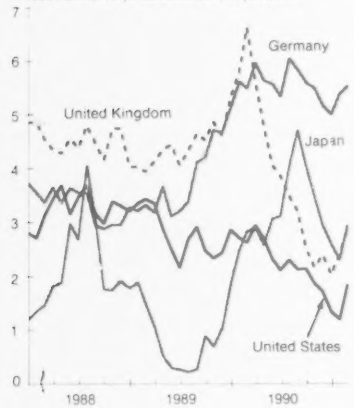
The liberalization and integration of world capital markets in the 1980s was inspired by a combination of hope and necessity. The hope lay in the expectation of more efficient allocation of saving and investment, both within national markets and across the world at large. The necessity stemmed from the macroeconomic and financial instability of the inflationary 1970s.

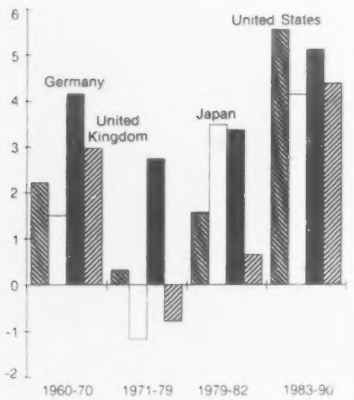
The instability engendered government deficits and external imbalances that required financing on a scale unprecedented in peacetime and that exceeded the capacity or willingness of the traditionally fragmented financial markets to cover. These financing needs joined with advances in technology and communications to spawn a host of innovations, ranging from securitization in place of intermediated bank credit to new deriva-

Chart 17

Real government bond yields

proxied as nominal yields on 10-year governments less 12-month price inflation, in percent





Upper panel: "core" consumer prices excluding food, energy, and (United Kingdom only) mortgage interest rates.
Lower panel: all consumer prices.

tive instruments, including swaps. Taken together, these financial innovations have helped overwhelm traditional and regulatory segmentation of national markets and thereby have contributed much to the effective integration of financial markets globally.

By the early-to-mid-1980s — soon after a number of major countries abolished almost all interest rate and exchange controls — global integration became a substantially accomplished fact among the short-term cash money markets and the more active of the currency forwards and futures markets; accomplished, at least, in the sense that these markets have no longer exhibited consistently exploitable and empirically verifiable arbitrage opportunities. In these markets, therefore, "covered interest rate parity" (CIP) holds, more or less.*

It has taken the maturation of the swaps markets, however, to yield evidence of, or even bring to pass, a comparable integration of the longer-term capital markets. There, swaps have come to provide a liquid and functionally close substitute for the poorly developed, even absent, forwards and futures dimensions. Indeed, CIP holds about as well in the long- as in the short-term markets.

Thus, swaps have helped extend the integration of the foreign exchange and interest rate markets across all maturities. This marks a further attenuation of national policymakers' "independence" or, more accurately, their ability to pursue old-fashioned "business as usual." Some once may have been able to conduct monetary and exchange rate policies independently and toward different ends. Traditional policy tools now have less certain effect — quantitatively for sure and often in their qualitative incidence as well — and policymakers must adapt accordingly.

It should not be imagined, however, that market integration makes it only a matter of time until real interest rates come together globally. In fact, experience during 1989-90 reversed relationships that had prevailed earlier through much of the 1980s, instead displaying sharply rising real interest rates in Japan and a high level of real rates in Germany, along with falling real rates in the United States (see Chart 17). In turn, real interest rate divergence helps explain why the demise of controls and other barriers to international capital flow has weakened, but has not eliminated, the post-World War II correlation between national saving and investment rates.

Thus, borders still matter, if less so than before: credit quality perceptions are not uniform, and different currencies have not become close substitutes in the minds of borrowers and investors. True, borders within Europe are losing relevance as the EC single market plan goes forward, but completion of a monetary union still lies several years into the future. For now, what already has changed fundamentally across the industrial world at large is the increasing scope for both borrowers and investors to exercise a global freedom of choice in financing

*Covered interest parity asserts that, in free markets, the forward premium or discount on the exchange rate between two currencies should equal the corresponding interest rate differential, apart from transactions costs, political and credit risks and, empirically, noncomparability of assets along with measurement error.

and portfolio strategies.

Exercise of this freedom is becoming virtually an obligation. So too is the use of financial derivatives in its furtherance. Derivatives allow speedy and flexible response to actual or perceived changes in underlying portfolio risk exposures. They otherwise simplify and optimize funding and risk management inasmuch as they permit a desired combination of liquidity, cash flow, interest rate, currency, and market source characteristics to be achieved by *separable* choices. In turn, the further specialization of risk management services spurs qualitative improvements and cost savings.

The various financial derivative products, including swaps, all have their pluses and minuses. Each has potential for growth, and no one type seems destined to dominate. Still, organized futures exchanges, for example, will focus on providing maximum liquidity and lowest transactions costs in a few high-volume instruments. Swaps will continue to provide a distinct, broader, and more flexible means of shifting maturity, currency, and credit exposure. The several derivatives classes will go forward in competitive coexistence, not least because many of the opportunities and efficiencies they afford will continue even in the event that the world economy attains a greater degree of financial stability than in recent years.

To secure optimum benefit from derivatives applications, managers and accountants will have to cast off outmoded conventions and, in particular, apply more rigorous mark-to-market analysis to their decisions. This is partly a matter of updating the habits of hands-on practitioners. In addition, their directors and trustees often will have to reconsider old rules that fail to provide for the prudent use of derivative instruments.

Vital too will be the ongoing reshaping of fiscal, regulatory, and statutory environments for the modern age. For example, in the fiscal area, the vacillation of the U.S. Internal Revenue Service on the status of swaps undertaken by pension funds and other tax-exempt institutions is past due for settlement. Prominent among statutory impediments is the recent U.K. finding that local authorities are ineligible to enter swaps under current law.* This finding reinforces the necessity for careful analysis of a prospective counterparty's legal capacity, especially if a statutory or regulated entity, as part of a reasoned judgment of business risk.

In sum, the various national capital markets are not truly one today, and perhaps may never be so — even presuming ever-increasing derivative activity and capital flow across national borders. In particular, investors face differing income and infla-

*In January, the U.K. Law Lords held that the London Borough of Hammersmith and Fulham exceeded its powers by entering interest rate swap contracts during the 1980s, and therefore was not liable for up to $600 million ($8000 per resident taxpayer) of mark-to-market losses reportedly incurred through these deals. Imputing speculative character to all interest rate swaps, the judgment revisited the age-old conundrum of where, or even whether, to draw an enforceable distinction between acts of speculation and others aiming to limit risk, especially when a single type of instrument, such as a swap, can be applied to either end (see also Chart 10). Earlier, the Bank of England had blessed swaps as a risk management tool and legal advice from the most respected quarters had supported their use by local authorities. The Lords' judgment brings home the frailty of advice — no matter how "authoritative" — in the absence of definitive legal determination, and also the paradox that financial innovation cannot simply be postponed pending such determination.

tion risks in their home countries; allowing too for currency risk, they are bound to make differing evaluations of the expected risks and returns on domestic and foreign assets. Risk aversion, custom, and distrust of foreign entanglements still cause some to cling purely to holdings in their home markets when cross-border diversification makes more sense.

The modern science of risk management reaches out to these broader horizons. The swaps and other derivatives markets offer an increasingly ready means to exploit the opportunities already available. And the application of swaps and derivatives techniques to new objects ripe for management, for example in the equities and commodities sectors, is enlarging the opportunity set day by day.

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Information herein is from sources considered to be reliable but is furnished without responsibility on the part of Morgan Guaranty Trust Company.

Effective exchange rates — industrial countries

Index numbers, 1980-82 average=100.

	United States	Canada	Japan	Australia	France	Germany	Italy	United Kingdom	Austria	Belgium	Neth-erlands	Spain	Swit-zerland	Den-mark	Norway	Swe-den
Nominal against 15 other industrial-country currencies																
1986	106.0	87.6	150.3	61.6	87.4	116.2	82.8	80.7	107.8	92.9	110.4	73.4	118.1	99.7	89.3	81.5
1987	94.1	89.6	164.3	58.3	87.1	122.0	82.2	78.9	110.8	95.6	114.6	73.0	123.0	102.8	85.7	80.0
1988	88.0	95.6	181.4	62.0	85.7	121.8	79.8	83.7	110.2	94.6	114.4	75.5	121.9	101.2	85.6	80.2
1989	91.3	100.5	172.7	65.6	84.9	121.1	80.6	81.3	110.0	94.2	113.6	76.8	115.8	99.0	85.8	81.1
1990	86.6	100.7	156.9	62.4	88.1	124.9	81.3	79.3	112.0	97.6	116.4	81.8	121.3	104.7	85.3	78.9
1990																
March	90.6	100.6	151.4	63.1	87.9	124.9	81.8	75.8	112.1	97.3	116.6	80.1	117.2	104.6	85.3	80.0
April	90.4	101.9	145.7	64.0	88.4	124.9	82.1	75.7	112.2	97.8	116.7	81.1	118.2	105.3	85.2	79.9
May	89.4	100.7	149.0	62.8	88.0	124.7	82.0	76.4	111.8	97.8	116.6	82.3	122.0	105.3	85.2	79.5
June	89.4	100.8	149.3	64.2	87.5	123.9	81.6	78.5	111.4	97.7	115.8	82.9	122.3	104.6	85.3	79.3
July	87.0	101.6	152.0	63.7	87.8	123.9	81.7	81.2	111.4	97.4	115.6	83.5	121.7	104.5	85.3	79.0
August	84.8	102.1	151.1	63.7	88.2	124.5	81.5	82.6	111.6	97.8	116.0	83.5	124.9	104.6	85.3	78.4
September	84.0	100.7	161.0	64.2	88.6	124.5	80.4	81.4	111.6	97.8	116.0	82.1	125.1	104.8	85.3	78.5
October	81.8	100.0	170.4	60.5	88.8	124.9	80.3	82.3	111.8	97.9	116.2	82.4	124.3	105.1	85.1	78.4
November	81.1	99.7	169.9	57.9	89.0	126.0	80.7	81.8	112.3	98.3	116.8	82.4	124.1	105.5	85.6	77.9
December	82.2	100.2	164.9	58.6	88.5	126.6	80.8	81.0	112.9	98.4	117.2	81.9	123.1	105.3	85.5	77.8
1991																
January	82.2	100.4	165.2	59.3	88.0	125.9	80.7	81.6	112.2	98.5	116.9	82.9	124.7	105.1	85.3	78.0
February	81.1	100.2	168.0	58.8	88.0	126.5	81.1	81.7	112.4	98.8	117.1	83.7	122.8	105.3	85.5	78.1
Real against 15 other industrial-country currencies																
1986	102.6	93.5	115.6	79.7	103.7	103.8	103.1	87.7	107.2	84.9	101.4	94.3	101.9	107.9	97.8	96.3
1987	91.9	96.8	119.6	81.7	104.9	107.2	104.1	87.7	109.5	84.8	104.3	96.3	105.7	112.2	101.0	95.8
1988	87.5	104.8	126.0	91.1	102.3	106.5	104.4	94.5	108.2	81.6	100.8	100.9	102.9	112.1	102.1	99.3
1989	92.0	107.7	118.3	97.9	100.3	105.0	108.0	93.9	107.9	80.4	97.6	106.7	96.3	110.5	101.6	104.8
1990	88.2	104.0	105.9	94.2	103.7	107.2	107.0	95.3	111.3	84.1	99.1	112.8	102.0	117.7	101.7	103.0
1990																
March	91.8	104.8	103.4	95.1	103.5	107.4	108.3	90.1	110.8	83.7	98.9	110.8	98.4	117.4	101.9	104.4
April	91.7	105.7	99.6	96.5	104.0	107.4	108.5	90.4	110.8	84.1	99.7	112.1	99.2	118.0	100.5	104.0
May	90.6	104.7	101.2	94.9	103.5	107.3	108.0	91.6	109.7	84.3	99.5	113.4	102.6	118.5	101.3	103.4
June	90.6	104.5	101.5	97.1	102.9	106.6	107.3	94.0	109.7	84.7	98.3	114.4	103.3	117.3	100.9	103.4
July	88.4	105.1	102.9	96.3	103.4	106.6	107.4	97.6	111.8	84.6	96.9	115.1	102.6	116.7	100.8	102.8
August	86.4	105.3	102.2	96.3	104.0	106.6	107.1	99.7	112.6	84.7	98.0	115.1	104.9	117.6	100.7	102.2
September	85.6	104.0	107.9	97.0	104.1	106.2	105.4	98.3	111.6	84.9	99.4	113.1	106.1	118.1	102.2	102.4
October	84.0	102.2	113.1	91.4	104.6	106.6	105.1	100.0	111.6	83.9	99.9	113.6	104.9	118.4	103.7	101.7
November	83.5	101.4	112.9	87.5	104.7	107.6	105.5	99.6	111.7	84.3	100.7	113.7	104.5	119.4	102.4	101.6
December	84.7	101.2	109.9	88.6	104.1	107.9	105.6	98.7	112.7	84.1	101.7	113.2	103.5	118.9	102.3	101.8
1991																
January	84.7	101.1	110.2	89.2	103.1	107.1	105.0	100.5	112.4	84.6	101.5	115.0	104.7	117.5	103.2	102.5
February	83.4	100.9	111.8	88.3	102.8	107.2	105.1	98.7	113.2	85.6	102.0	116.9	103.9	117.8	103.9	102.4
Real against 18 other industrial-country and 22 LDC currencies																
1986	108.3	94.7	120.3	81.6	104.5	105.1	104.8	88.7	108.1	85.5	101.5	97.3	103.9	108.7	98.8	97.4
1987	98.3	97.2	123.6	83.3	106.4	109.8	106.9	89.6	111.2	86.1	105.5	100.4	108.9	113.4	102.3	97.4
1988	92.9	104.5	129.2	92.3	103.2	108.7	106.5	96.0	109.4	82.4	101.3	104.3	105.2	113.2	103.3	100.6
1989	97.0	107.9	122.0	98.6	100.8	105.7	109.5	94.7	108.5	80.6	97.4	110.1	98.0	111.2	102.4	105.3
1990	92.9	103.6	108.1	95.2	105.0	109.3	109.8	97.0	112.7	85.2	100.3	117.1	104.6	118.7	102.6	103.9
1990																
March	95.8	104.7	105.2	95.5	104.5	109.1	110.5	91.2	112.0	84.4	99.6	114.5	100.7	118.3	102.7	105.0
April	96.0	105.7	101.6	97.0	105.2	109.4	111.0	91.7	112.2	85.0	100.7	116.2	101.6	119.0	101.2	104.7
May	95.0	104.6	103.1	95.5	104.7	109.4	110.6	93.1	111.2	85.3	100.5	117.6	105.1	119.5	102.1	104.2
June	95.0	104.4	103.4	97.7	104.1	108.5	109.8	95.5	111.1	85.6	99.4	118.4	105.7	118.3	101.7	104.2
July	93.2	104.9	104.8	97.3	104.7	108.7	110.1	99.2	113.2	85.5	98.0	119.3	105.0	117.7	101.7	103.7
August	91.3	104.9	104.1	97.4	105.5	109.0	110.2	101.7	114.2	85.9	99.5	119.7	107.6	118.7	101.6	103.3
September	90.6	103.4	110.7	98.2	105.6	108.6	108.5	100.5	113.2	86.2	101.0	117.5	108.7	119.3	103.1	103.5
October	89.2	101.4	115.8	92.9	106.0	109.1	108.2	102.2	113.2	85.2	101.5	118.0	107.6	119.6	104.7	103.0
November	88.7	100.5	115.3	88.9	106.2	110.3	108.8	101.8	113.4	85.7	102.5	118.2	107.4	120.6	103.4	102.8
December	89.9	100.6	112.5	90.0	105.7	110.7	108.9	100.9	114.4	85.6	103.5	117.7	106.4	120.1	103.3	103.0
1991																
January	90.0	100.5	112.9	90.8	104.8	109.9	108.3	102.9	114.1	86.1	103.4	119.7	107.6	118.9	104.3	103.9
February	89.0	100.2	114.7	90.2	104.6	110.3	108.7	103.4	115.0	87.1	104.1	122.2	106.9	119.2	105.0	103.9

Real effective exchange rates — developing countries

Index numbers, 1980-82 average=100.

	Argentina	Brazil	Chile	Colombia	Mexico	Peru	Venezuela	Hong Kong	Indonesia	Korea	Malaysia	Philippines	Singapore	Taiwan	Israel	Turkey
1986	61.1	75.0	68.8	68.1	62.9	97.0	90.7	94.0	73.6	76.4	95.5	91.0	81.0	86.4	101.0	71.9
1987	53.7	74.4	65.6	63.7	64.6	108.9	65.3	90.0	56.1	75.7	89.6	87.7	74.6	91.8	97.6	63.8
1988	59.9	81.5	60.7	61.5	76.9	130.1	72.0	90.7	54.1	82.4	80.5	89.6	73.2	95.3	107.1	65.1
1989	51.7	99.4	62.3	60.8	73.7	140.0	63.3	98.9	55.7	92.4	80.0	95.8	78.3	101.0	109.4	73.7
1990	59.9	119.2	60.0	55.7	68.8	183.8	52.5	99.2	54.7	85.4	75.8	88.4	80.8	94.1	102.9	76.9
1990																
March	50.9	149.7	57.9	57.7	68.6	227.4	55.6	100.1	56.5	88.0	78.6	92.9	81.1	96.8	106.0	77.7
April	52.6	131.6	59.2	57.3	68.8	223.7	54.0	100.9	57.0	87.4	78.2	92.7	81.3	96.7	106.2	77.2
May	57.2	125.4	59.5	56.8	68.7	206.6	52.4	102.6	56.2	86.6	77.7	91.7	81.0	94.4	104.4	76.4
June	58.7	121.4	60.4	56.5	69.7	206.1	53.8	103.2	56.6	86.2	77.7	91.7	81.1	93.8	103.1	75.7
July	59.2	112.7	61.2	55.8	69.3	207.1	51.3	99.5	55.8	84.6	76.5	90.2	80.7	93.1	100.8	73.7
August	59.8	114.9	59.2	54.8	69.1	177.2	51.4	97.0	54.7	83.4	75.1	87.6	80.4	92.6	100.1	72.8
September	66.7	121.3	61.2	54.5	68.8	115.7	51.5	98.7	53.4	83.9	74.2	87.1	80.2	92.4	100.1	77.0
October	70.9	107.6	62.3	53.4	68.1	120.4	50.8	97.6	51.8	82.8	72.1	85.2	79.5	92.1	100.7	78.6
November	77.3	97.2	60.9	52.8	68.3	129.5	49.9	98.5	51.6	82.1	71.6	77.2	81.7	91.3	99.8	79.1
December	61.6	89.1	61.6	52.5	69.1	138.8	50.8	99.6	51.7	83.5	72.1	78.9	81.7	91.7	100.5	81.3
1991																
January	69.7	92.2	61.2	54.2	69.6	164.3	50.6	96.7	51.5	83.4	71.6	76.8	80.6	91.5	101.5	80.7
February	50.3	94.2	62.8	54.2	69.5	221.7	48.3	96.3	50.5	82.5	71.3	75.6	81.0	90.5	100.5	79.6

J.P. Morgan Government Bond Index

Index of total return for traded bonds, December 31, 1987=100
end of month

	1989	1990	1990							1991			
	Dec	Dec	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr 5
In local currencies													
Australia	124.83	148.31	131.14	133.95	135.24	136.97	140.00	145.28	148.31	151.98	154.24	156.22	156.79
Belgium	110.91	120.82	116.35	118.09	116.68	116.11	119.04	120.09	120.82	123.12	126.57	126.54	127.35
Canada	122.99	132.11	122.21	124.61	125.28	123.78	125.83	129.51	132.11	135.67	138.67	139.96	140.78
France	121.06	129.93	125.68	127.61	124.54	124.13	126.98	128.87	129.93	133.53	137.89	138.31	139.50
Germany	106.26	107.42	104.16	105.85	104.62	104.62	106.11	107.17	107.42	109.34	111.86	111.87	112.94
Italy	125.01	143.28	135.80	137.33	136.50	138.96	141.14	141.51	143.28	145.00	147.50	150.31	151.04
Japan	104.30	105.11	100.99	99.92	97.74	96.59	100.91	102.89	105.11	106.87	107.84	107.35	107.61
Netherlands	105.84	109.30	105.87	107.56	106.54	106.31	107.83	108.75	109.30	111.09	113.61	113.55	114.61
Spain	119.82	137.54	128.66	130.22	131.08	131.46	134.22	136.06	137.54	139.21	142.67	146.52	146.35
United Kingdom	115.29	126.28	116.26	116.79	116.79	117.44	121.90	126.13	126.28	131.50	133.35	134.68	135.16
United States	121.70	132.22	124.35	125.96	124.55	125.64	127.63	130.28	132.22	133.57	134.08	134.77	135.40
In dollars													
Australia	136.50	158.68	143.96	147.38	152.50	156.76	152.31	155.81	158.68	164.74	168.08	167.58	170.64
Belgium	102.74	128.85	112.24	119.21	118.60	118.51	125.75	127.56	128.85	132.92	132.83	119.31	121.88
Canada	138.06	148.03	136.34	140.59	140.84	139.08	140.12	144.38	148.03	150.90	156.72	156.95	158.67
France	111.33	136.22	119.60	127.43	125.10	125.70	132.99	135.36	136.22	141.34	141.19	127.89	130.45
Germany	98.56	113.14	98.26	104.52	103.97	104.64	109.79	112.17	113.14	116.10	115.03	103.33	105.43
Italy	114.27	147.19	128.88	136.88	135.27	137.16	144.06	145.65	147.19	151.30	150.06	138.07	140.30
Japan	87.70	94.01	80.27	82.82	82.19	84.49	94.18	93.87	94.01	98.52	98.23	92.41	95.36
Netherlands	97.90	114.76	99.83	106.05	105.79	106.09	111.37	113.55	114.76	117.73	116.66	104.79	106.84
Spain	117.52	154.03	134.89	143.01	143.95	143.78	151.31	152.99	154.03	161.05	161.15	148.73	151.22
United Kingdom	98.66	129.55	107.75	115.15	117.10	116.63	125.78	129.79	129.55	137.01	135.08	124.89	126.95
United States	121.70	132.22	124.35	125.96	124.55	125.64	127.63	130.28	132.22	133.57	134.08	134.77	135.40
Global	112.14	125.34	113.67	117.01	116.10	117.18	121.81	123.96	125.34	128.18	128.29	124.28	125.77
Global excluding United States	99.25	114.78	99.40	104.50	104.11	105.16	112.43	114.01	114.78	119.10	118.79	109.86	112.23

Government bond yields

by maturity sectors in years, for traded bonds included in the J.P. Morgan Government Bond Index in percent per annum (semiannual basis), at end of month

	1989	1990	1990							1991			
	Dec	Dec	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr 5
Australia													
1-3	14.30	11.78	14.05	13.71	13.30	12.99	12.53	12.22	11.78	11.50	11.05	11.13	**11.12**
3-5	13.57	11.88	13.79	13.48	13.36	13.09	12.70	12.34	11.88	11.54	11.20	11.23	**11.21**
5-7	13.39	12.03	13.81	13.47	13.47	13.37	13.08	12.34	12.03	11.62	11.45	11.34	**11.30**
7+	12.97	12.04	13.49	13.25	13.53	13.59	13.31	12.27	12.04	11.54	11.50	11.37	**11.33**
Belgium													
<5	9.74	9.88	9.56	9.40	9.89	10.11	9.74	9.75	9.88	9.59	9.03	9.20	**9.12**
5+	9.44	9.73	9.53	9.38	9.85	10.19	9.79	9.73	9.73	9.49	8.98	9.14	**9.02**
Canada													
1-3	10.64	10.62	11.79	11.31	10.89	11.13	11.08	10.68	10.62	9.94	9.49	9.47	**9.28**
3-5	10.05	10.40	11.35	10.84	10.71	11.11	10.97	10.54	10.40	9.99	9.44	9.45	**9.32**
5-7	9.78	10.27	11.14	10.76	10.74	11.11	10.93	10.49	10.27	9.96	9.43	9.44	**9.38**
7-10	9.65	10.27	10.86	10.60	10.76	11.19	11.00	10.57	10.27	10.02	9.57	9.58	**9.50**
10+	9.51	10.33	10.61	10.52	10.74	11.23	11.07	10.61	10.33	10.13	9.81	9.75	**9.69**
France													
1-3	10.01	9.92	9.62	9.37	9.94	10.03	9.81	9.82	9.92	9.70	8.99	9.02	**8.97**
3-5	9.65	9.92	9.59	9.37	10.01	10.13	9.87	9.81	9.92	9.60	8.89	8.93	**8.83**
5-7	9.32	9.81	9.47	9.27	9.94	10.20	9.89	9.79	9.81	9.39	8.81	8.91	**8.76**
7-10	9.12	9.74	9.38	9.25	10.02	10.32	10.00	9.80	9.74	9.28	8.82	8.93	**8.76**
10+	9.14	9.80	9.51	9.39	10.16	10.47	10.14	9.88	9.80	9.30	8.87	8.99	**8.82**
Germany													
<5	7.57	8.90	8.63	8.45	8.81	8.93	8.79	8.85	8.90	8.80	8.42	8.53	**8.38**
5-7	7.48	8.95	8.71	8.50	8.91	9.05	8.87	8.85	8.95	8.73	8.33	8.46	**8.30**
7+	7.33	8.85	8.61	8.41	8.85	9.00	8.88	8.73	8.85	8.56	8.23	8.39	**8.20**
Italy													
1-3	13.99	13.72	13.05	12.95	13.45	12.99	13.15	13.71	13.72	13.69	13.56	13.36	**13.18**
3+	14.25	14.04	13.31	13.40	14.39	14.03	13.77	14.11	14.04	14.13	13.84	13.52	**13.42**
Japan													
1-3	6.04	7.04	6.89	7.37	7.94	8.44	7.43	7.16	7.04	6.83	6.57	6.79	**6.81**
3-5	5.95	6.84	6.80	7.22	7.90	8.28	7.33	7.11	6.84	6.59	6.36	6.69	**6.70**
5-7	5.75	6.87	6.86	7.25	7.88	8.10	7.38	7.17	6.87	6.64	6.55	6.79	**6.77**
7-10	5.56	6.71	6.88	7.09	7.62	7.98	7.28	7.01	6.71	6.52	6.49	6.62	**6.61**
10+	5.54	6.52	6.61	6.92	7.40	7.73	7.18	6.94	6.52	6.35	6.63	6.80	**6 81**
Netherlands													
1-3	8.42	9.09	8.81	8.63	8.98	9.15	8.98	9.08	9.09	9.01	8.50	8.71	**8.59**
3-5	7.91	9.01	8.77	8.55	8.93	9.10	8.92	8.93	9.01	8.88	8.53	8.67	**8.57**
5-7	7.84	8.98	8.72	8.55	8.93	9.10	8.95	8.94	8.98	8.80	8.45	8.59	**8.50**
7+	7.71	8.96	8.69	8.52	8.89	9.10	8.97	8.91	8.96	8.75	8.45	8.58	**8.42**
Spain													
1-3	14.46	14.29	14.16	14.03	14.41	14.91	14.32	14.24	14.29	14.22	13.45	12.66	**12.71**
3+	13.77	14.11	13.92	13.96	14.36	14.54	14.44	14.13	14.11	13.96	13.19	12.25	**12.30**
United Kingdom													
1-3	12.38	11.53	12.75	12.67	12.52	12.70	11.42	11.14	11.53	11.44	10.52	10.41	**10.37**
3-5	11.24	11.20	11.98	12.03	12.02	12.09	11.23	10.87	11.20	10.66	10.19	10.20	**9.94**
5-7	11.06	11.06	11.76	11.85	12.03	12.06	11.30	10.82	11.06	10.36	10.17	10.15	**10.01**
7-10	10.59	11.05	11.62	11.75	11.96	12.05	11.44	10.88	11.05	10.34	10.26	10.20	**10.18**
10+	10.17	10.79	11.19	11.29	11.57	11.63	11.25	10.73	10.79	10.15	10.05	10.07	**10.01**
United States													
1-3	7.90	7.23	8.23	7.90	8.10	8.03	7.76	7.56	7.23	7.03	7.01	6.97	**6.90**
3-5	7.92	7.59	8.36	8.07	8.43	8.35	8.09	7.83	7.59	7.45	7.49	7.57	**7.48**
5-7	7.98	7.87	8.44	8.22	8.65	8.59	8.36	8.07	7.87	7.76	7.79	7.89	**7.80**
7-10	7.99	8.08	8.46	8.33	8.80	8.78	8.58	8.25	8.08	7.99	8.00	8.06	**7.99**
10+	8.08	8.31	8.52	8.49	9.06	9.02	8.84	8.46	8.31	8.27	8.28	8.31	**8.25**

Eurocurrency deposit rates

by country of currency, by maturity in months
prime banks' bid rates, at or near end of month

	Dec	Dec	1990						1991		
	1988	1989	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Australia											
1	14.63	17.38	14.84	13.86	13.63	12.81	12.44	11.83	11.88	11.63	11.66
3	15.25	17.13	14.63	13.72	13.36	12.61	12.33	11.88	11.75	11.47	11.50
6	15.48	16.61	14.42	13.69	13.25	12.48	12.31	11.88	11.56	11.36	11.42
12	15.56	16.22	14.45	13.86	13.44	12.63	12.45	12.13	11.84	11.41	11.48
Belgium											
1	7.31	10.13	9.31	9.13	8.88	8.88	8.88	10.06	9.88	9.25	9.25
3	7.44	10.13	9.31	9.19	8.94	8.94	9.13	10.06	9.88	9.25	9.38
6	7.50	10.13	9.19	9.38	9.19	9.19	9.38	10.13	9.88	9.25	9.38
12	7.50	10.19	9.19	9.69	9.56	9.38	9.38	10.13	9.88	9.25	9.38
Canada											
1	10.13	12.00	12.88	12.38	11.88	12.00	11.88	10.88	10.69	9.50	9.50
3	10.63	12.00	12.88	12.38	11.94	12.00	11.69	11.13	10.56	9.56	9.38
6	11.00	11.88	12.50	12.06	11.88	11.88	11.50	11.00	10.00	9.50	9.38
12	11.13	11.63	12.44	11.88	11.69	11.56	11.25	10.81	9.88	9.44	9.38
France											
1	8.56	11.00	9.75	9.88	9.88	9.63	9.75	9.88	9.94	9.19	9.19
3	8.63	11.19	9.81	10.19	10.25	9.75	9.94	10.06	10.06	9.31	9.31
6	8.63	11.25	9.88	10.38	10.44	9.94	10.06	10.31	10.13	9.38	9.44
12	8.75	11.06	10.00	10.50	10.75	10.13	10.25	10.44	10.25	9.44	9.50
Germany											
1	5.25	8.13	8.13	8.19	8.25	8.25	9.19	9.13	8.94	8.94	9.00
3	5.31	8.19	8.19	8.38	8.56	8.56	9.19	9.19	9.13	8.94	9.19
6	5.50	8.25	8.38	8.63	8.75	8.75	9.19	9.31	9.25	8.94	9.25
12	5.56	8.38	8.56	8.94	8.88	8.94	9.19	9.44	9.31	8.94	9.31
Italy											
1	11.25	12.38	10.88	10.00	8.88	10.25	12.50	11.50	12.00	12.50	11.13
3	11.63	12.50	10.88	10.75	10.00	10.63	12.38	11.88	12.00	12.13	11.13
6	11.88	12.50	11.13	11.38	10.88	10.94	12.38	12.38	12.13	12.13	11.13
12	12.13	13.00	11.38	11.75	11.50	11.38	12.25	12.25	12.38	12.25	11.31
Japan											
1	4.44	6.56	7.50	8.13	8.13	7.94	8.50	8.19	8.00	8.50	8.00
3	4.56	6.75	7.69	8.13	8.38	8.19	8.31	8.31	8.13	8.06	7.75
6	4.50	6.81	7.81	8.31	8.56	8.25	8.31	7.88	7.94	7.81	7.56
12	4.63	6.75	7.88	8.38	8.75	8.31	8.19	7.69	7.63	7.44	7.25
Netherlands											
1	5.69	8.56	8.13	8.19	8.19	8.06	8.50	9.63	9.00	8.88	9.19
3	5.69	8.56	8.19	8.38	8.38	8.38	8.81	9.50	9.13	8.88	9.19
6	5.75	8.56	8.31	8.56	8.63	8.56	9.00	9.50	9.31	8.88	9.19
12	5.75	8.56	8.56	8.81	8.75	8.75	9.13	9.50	9.38	8.94	9.19
Switzerland											
1	4.63	9.25	8.81	8.19	7.81	8.00	8.94	8.63	8.06	8.25	8.69
3	4.69	9.00	8.81	8.50	8.19	8.19	8.81	8.63	8.13	8.19	8.50
6	4.81	8.69	8.81	8.56	8.38	8.25	8.69	8.63	8.06	8.00	8.31
12	4.81	8.50	8.50	8.56	8.44	8.25	8.50	8.44	7.94	7.75	7.88
United Kingdom											
1	12.88	15.00	14.88	15.00	14.94	13.88	14.00	14.13	14.00	13.13	12.69
3	13.06	15.06	14.88	14.94	14.91	13.81	13.56	14.00	13.81	12.63	12.35
6	13.06	14.88	14.81	14.88	14.84	13.31	12.94	13.31	13.38	12.09	11.88
12	12.81	14.56	14.44	14.50	14.50	12.75	12.44	12.75	12.81	11.56	11.44
United States											
1	9.06	8.31	7.88	7.94	8.19	7.81	8.63	7.50	6.81	6.94	6.25
3	9.19	8.25	7.81	7.94	8.19	7.94	8.25	7.44	6.94	6.81	6.25
6	9.31	8.13	7.81	8.00	8.19	7.94	8.13	7.44	6.94	6.81	6.38
12	9.50	8.13	7.88	8.13	8.31	8.00	8.00	7.44	7.19	7.13	6.88
European currency unit											
1	7.94	11.06	9.88	9.88	9.94	9.69	10.38	10.69	9.81	9.44	9.38
3	8.00	11.19	10.13	10.25	10.25	9.94	10.38	10.69	10.06	9.44	9.44
6	8.13	11.31	10.31	10.50	10.56	10.06	10.38	10.75	10.19	9.44	9.44
12	8.13	11.19	10.44	10.63	10.81	10.25	10.38	10.63	10.25	9.44	9.44

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